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Intensive Horticulture in California

CHARLES HOWARD SHINN

Reprint from

The Land of Sunshine, Los Angeles, California

Feb., Mch. and Apr., 1901.

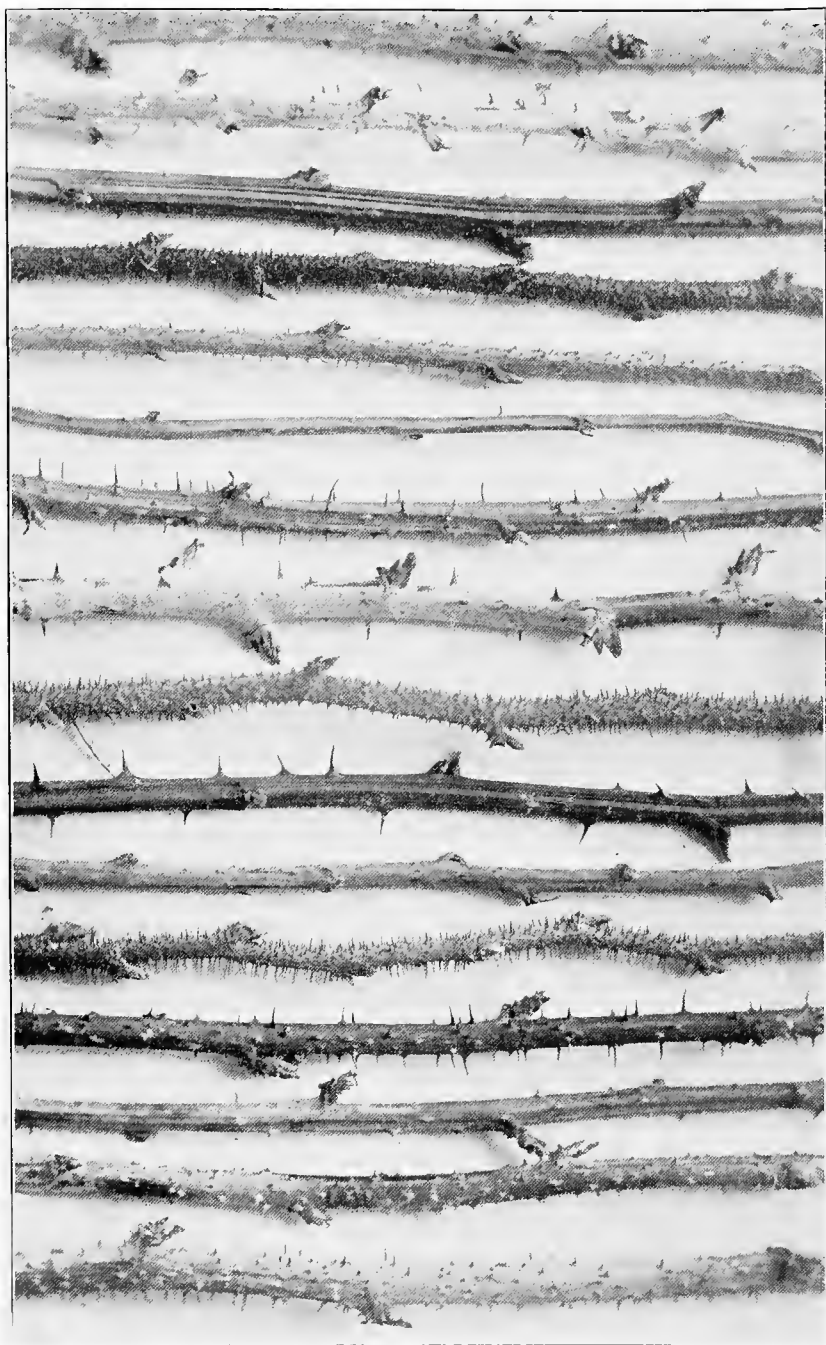


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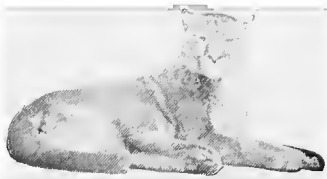
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REPRINTED FROM LAND OF SUNSHINE
THE MAGAZINE OF CALIFORNIA AND THE WEST
FEBRUARY, 1901



BLACKBERRY-RASPBERRY HYBRIDS.

Variations in stem in one lot of seedlings. See pp. 103, 107.



"THE LANDS OF THE SUN EXPAND THE SOUL."



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LOS ANGELES

FEBRUARY, 1901

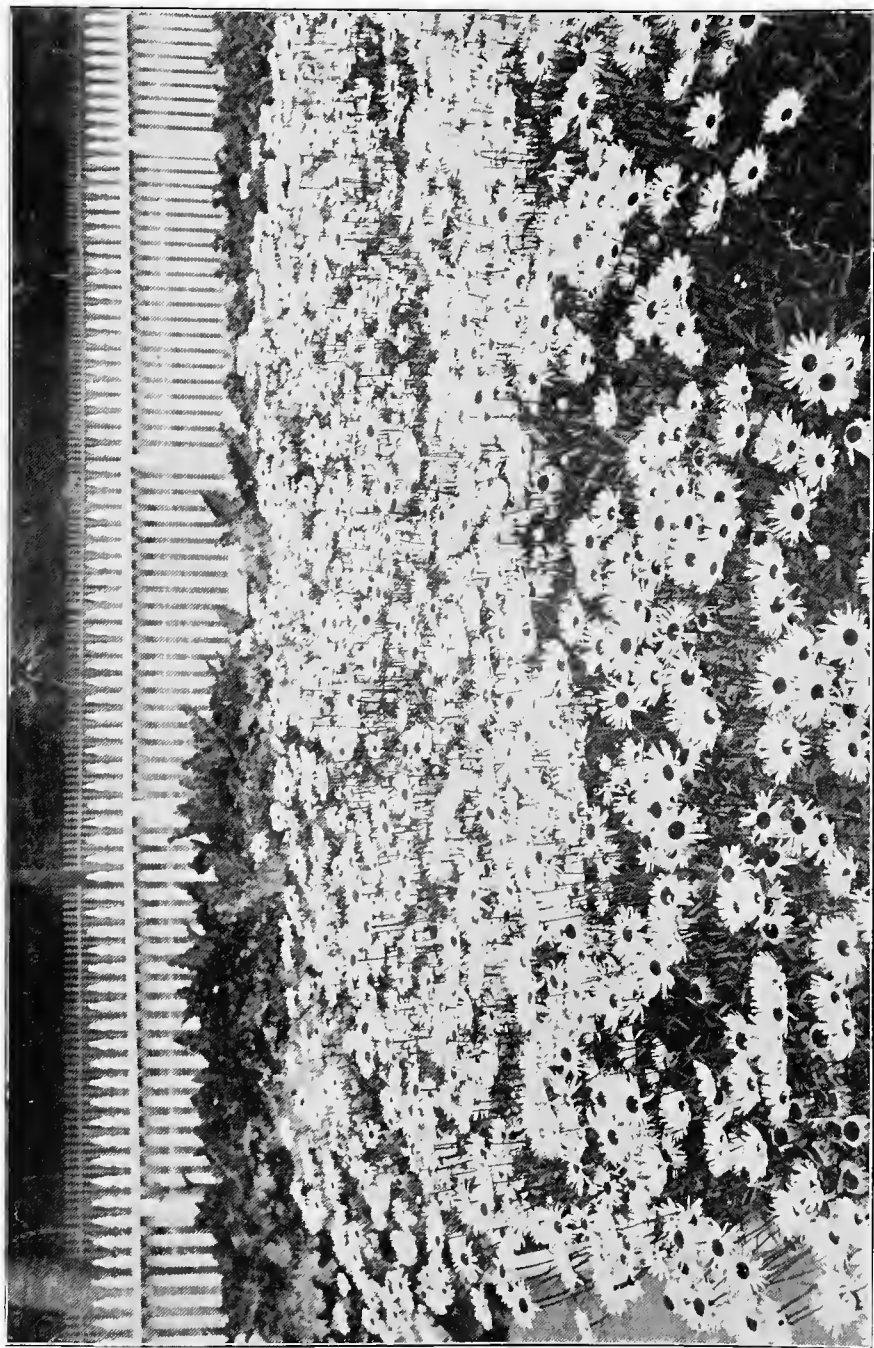
A WIZARD OF THE GARDEN.

BY CHARLES HOWARD SHINN, INSPECTOR OF EXPERIMENT STATIONS, U. OF C.



AS the world's empty spaces fill and its unknown areas are mapped out, there rise explorers, great as Columbus and Livingstone, who lead the human race to continents not bounded by oceans nor bent to the circle of the zodiac. What if one of these continents, new risen against the horizon, were named by us "intensive horticulture," whose gifts when rightly understood shall in due season release brain-tired men from gray city pavements, sending each one to his own well-watered, fruit-giving, life-supplying acre?

Certain it is that at no time since authentic history began has the scientific culture of plants occupied so important a place in the economy of civilized nations. In a profound sense horticulture is the great conservative force underlying our modern life, and keeping us from destruction. Multitudes of complex, mighty and indispensable industries rest upon the growth of plants other than wheat, corn and clover. Acres of glass roofs, miles of hot-water pipes, countless gardens under semi-tropic suns, carry an ever-increasing wealth of blossom and fruitage, more and more feed and gladden the world, and expound a marvelous



CORNER OF A FIELD OF SHASTA DAISIES.

A WIZARD OF THE GARDEN.

gospel of plant-evolution. Indeed a new literature is springing up, fresh, bright, helpful, more fascinating than any novel. Read, if you please, Bailey's "The Evolution of our Native Fruits," his "Plant Breeding," or his "Survival of the Unlike," and you begin to understand in some small measure the charm and also the difficulty of producing new triumphs of horticulture.

It did not seem difficult to the writers of a few centuries ago with their child-like faith in every story they heard.

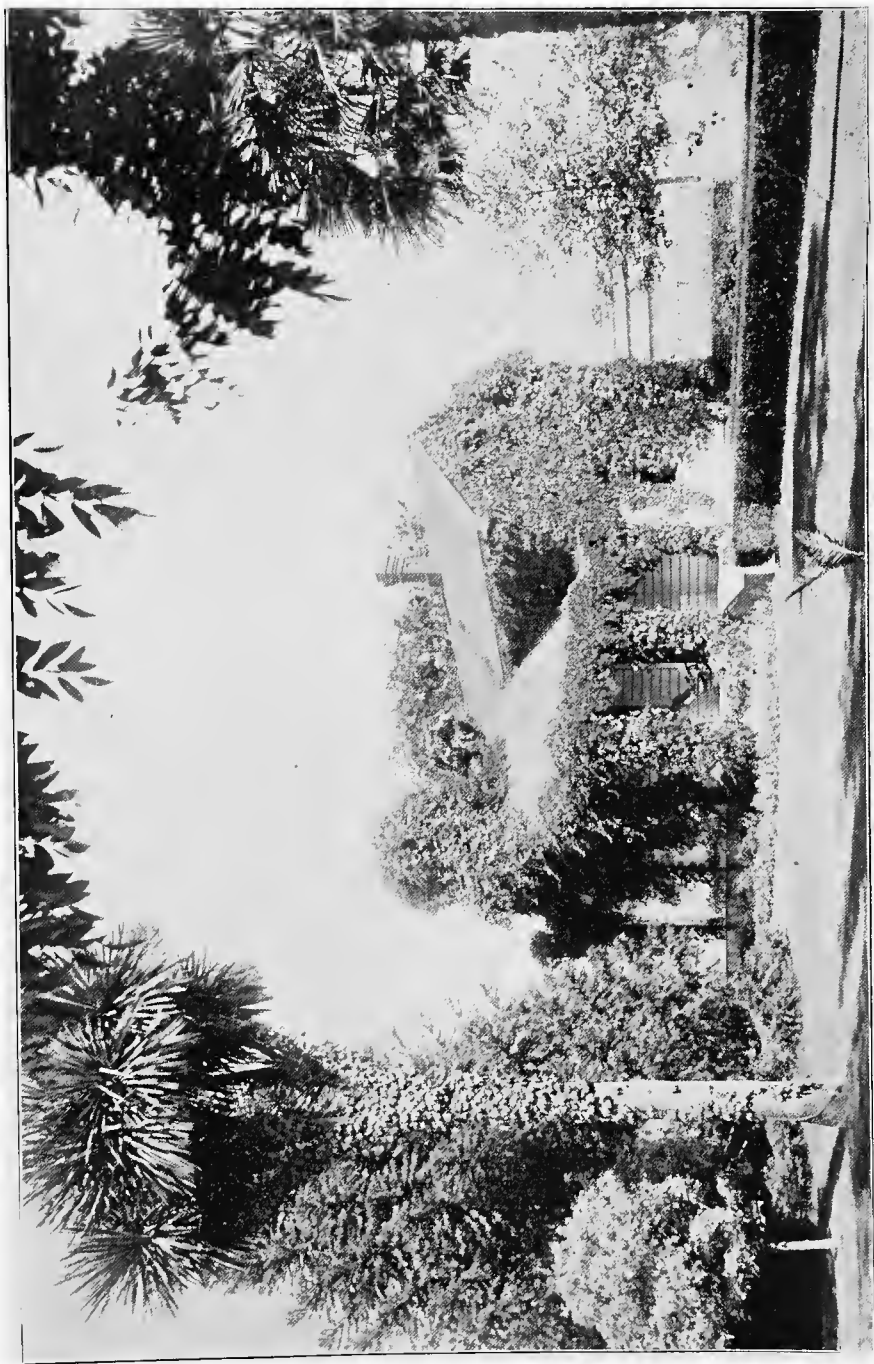
Good old Gervase Markham, for instance, in the third book of his "Countrey Farme" (London, 1616 edition), describes a system of grafting the olive upon the grape—an operation which unfortunately cannot be done in these degenerate days. He proceeds to explain that the "vinie qualitie" of the stock of the said grapevine "flavors the fruit of the olive;" then, by a far-off glimpse of truth, he adds that "the variableness of nature is showed thereby which is content to suffer herself to be draune to bring forth a mungrell fruit or second hermaphrodite to the coupling of two natures in one." Many a classic essay has since been written on the influence of stock upon graft or bud, thus quaintly foreshadowed nearly four centuries ago.

In these days of great discoveries some most suggestive steps are being taken toward undreamed-of developments of useful and beautiful plant-life. Individual plants of every species vary as much as individual animals do. Nature is continually producing variations among individual plants all over the world, and man has for ages taken fragmentary advantage of this fact, and has cultivated what seemed to the fashion of his time the most desirable forms.

What botanists agree in calling a species is really only a scientific judgment respecting a given type-form. The classification is highly useful—is indeed necessary, but it is not final, complete nor absolute as the systematic botanists used to believe. The modern view is that which Bailey



LUTHER BURBANK,
The Great Plant-Breeder.



BURBANK'S HOME IN SANTA ROSA.

expresses when he says, "All so-called species of plants are transitory and artificial groups maintained for convenience in the study of nature." No two living things are alike. The breeding of plants, as the breeding of animals, depends upon this variation, which the experimenter, by every means in his power directs, controls, augments and fixes in new forms. Not only individual plants vary, but each part of each plant varies from other parts — no two buds or branches are alike, and many new and valuable varieties have originated from a sport or the "accidental" variation of a bud from other buds on the same tree.

The person who aims to produce new forms of plant life is popularly called a hybridizer, and it is common to term nearly all new plants "hybrids."

But, in fact, the term

"plant-breeder" is better than hybridizer. Technically speaking, a hybrid is a union between species so-called, that is, between individuals which are only remotely connected. Crossbreeds are unions between individual plants of the same species. Hybrids between distinct genera, called "bi-geners," are very rare, and even different species of the genus very often refuse to hybridize. True hybrids are therefore unusual, but they often show vast gains in constitutional vigor and in size, and furnish the starting points



IMPROVED SCARLET CLEMATIS (3 on a stem, instead of 1, and all larger and better color.)



IN THE SEBASTOPOL EXPERIMENT GARDEN.

for varietal improvements. The great majority of our horticultural advances hitherto have been made by means of judicious cross-breeding, by painstaking selection of individuals, and by fixation of the new varieties. Much of this work is at present merely empiric, but the increasing literature devoted to plant-evolution gives us reason to hope that the observations and results of such men as Eckford, Lemoine and Benary in Europe, Carman, Munson and Burbank in America, will be coördinated by some master-mind into a true "philosophy of variation." The art itself (plant-breeding) has come from the observations of Camerarius in 1691, Thomas Fairchild's first plant hybrid in 1717, the experiments of Linnæus in 1759, and the work of Thomas Knight, Dean Herbert and others in the early part of the nineteenth century.

A great number of new varieties of plants are yearly offered to the public, many of which have merit. Few



WAGER PEACH, CROSSED WITH LANGUEDOC ALMOND.

growers, however, produce more than one or two valuable varieties in a lifetime; but we occasionally find a man peculiarly gifted for the work of aiding nature to produce varied forms, from which he selects those which best fit his plans, and from these breeds again and again until he shapes desired types into reasonable permanence of form. Such a person, now everywhere recognized as one of the greatest of living plant-breeders, is Luther Burbank of Santa Rosa, California, a man whose services to the world can hardly be estimated. In his hand a single cross-fertilized seed may contain the "power and potentiality" of a new race of plants destined profoundly to affect our modern life, and many outdoor industries.

Luther Burbank himself, as he appears to a stranger's casual glance, is a small, somewhat stooping, diffident and silent man; his reserve may even seem awkwardness, and

his diffidence has almost the air of dullness. He publishes seldom and composes with difficulty. He says little except when with tried friends, nor then often. He avoids publicity as much as possible, and slips quietly along through life, finding all his happiness in the care of his aged mother, now eighty-nine, and in his life-work of creating new fruits and flowers.

Thus much a stranger sees. His intimate friends see other things—a face refined and spiritualized by his occupation and by the fires of suffering; eyes that lighten at every look of friendship and every honest understanding of his work, or twinkle with shy humor and with swift, shrewd observations of his fellow-men. Little by little they find old-time simplicity married to a gigantic capacity for taking pains, and a charm of manner that grows on one like the fragrance of a field of sweet-brier roses. Such a man is deeply loved by those who know him best, but he must protect his vitality by living “far from the madding crowd” on his own acre, as Burbank does, and he must burn his shy, wild genius on his chosen altar.

It does burn there day and night, a sweet, fierce flame such as one could not dream this almost painfully retiring New Englander of the old, old pioneer stock could possess. The ancestors of him, if one rightly reads the natures of son and mother today, were mightily deceiving men and women, seemingly soft as silk, in reality durable as Toledo steel. Millions upon millions of cross-bred seedlings this small, nervous, tired-looking man has examined with keen eyes and capable mind, choosing, destroying; their very god incarnate. He has no foreman, no partner, no keeper of his records, only laborers for the mere manual operations on his experiment farms. Everything is carried in his own brain, and day by day he is leading upward to the light not only one but many new plant-combinations.

Luther Burbank's birthplace was in the little town of Lancaster, not far from Worcester, Massachusetts, and the date was March 7th, 1849. His opportunities for book-education were limited, but while still a boy he tried his 'prentice hand upon improving the “prosaic potato in his mother's garden,” and lo! the Burbank variety came into existence, still the leading kind grown in many countries, and particularly on the Pacific Coast.

John Gerarde, the sixteenth century herbalist, thought so much of the then newly-introduced potato that he had his picture drawn holding a potato flower; and Burbank might do worse than to put a potato blossom on his book-plate. A great seed firm bought the boy's new potato for a very few dollars and made large profits for years. What a



PART OF A ROW OF HYBRID BLACKBERRY-RASPBERRIES.—This plant is practically barren, but is the parent of many curious forms. The seed, which is produced only by applying pollen to the stigmas (it has no stamens) produces both raspberries and blackberries, and every grade between; some of marvelous vigor, some of little vitality. See pp. 107, 109.]



NEW WINTER RHUBARB.



ONE OF BURBANK'S GIANT CALLAS.

picture for someone to paint—that tow-headed boy of a dull New England village, away back in the closing years of the war, pollenating potato blossoms in his mother's vegetable garden! No one had put him on the track of that kind of work. He just "tried, to see what would happen."

But the boy had to make his living, and so he found work with the Ames Plow Company, where, after a little, he invented a machine for making patterns, and one that is still in use. It did not seem to him of much importance, but the Company wanted it, and said that as long as he continued to work for them he should have at least ten dollars a day!

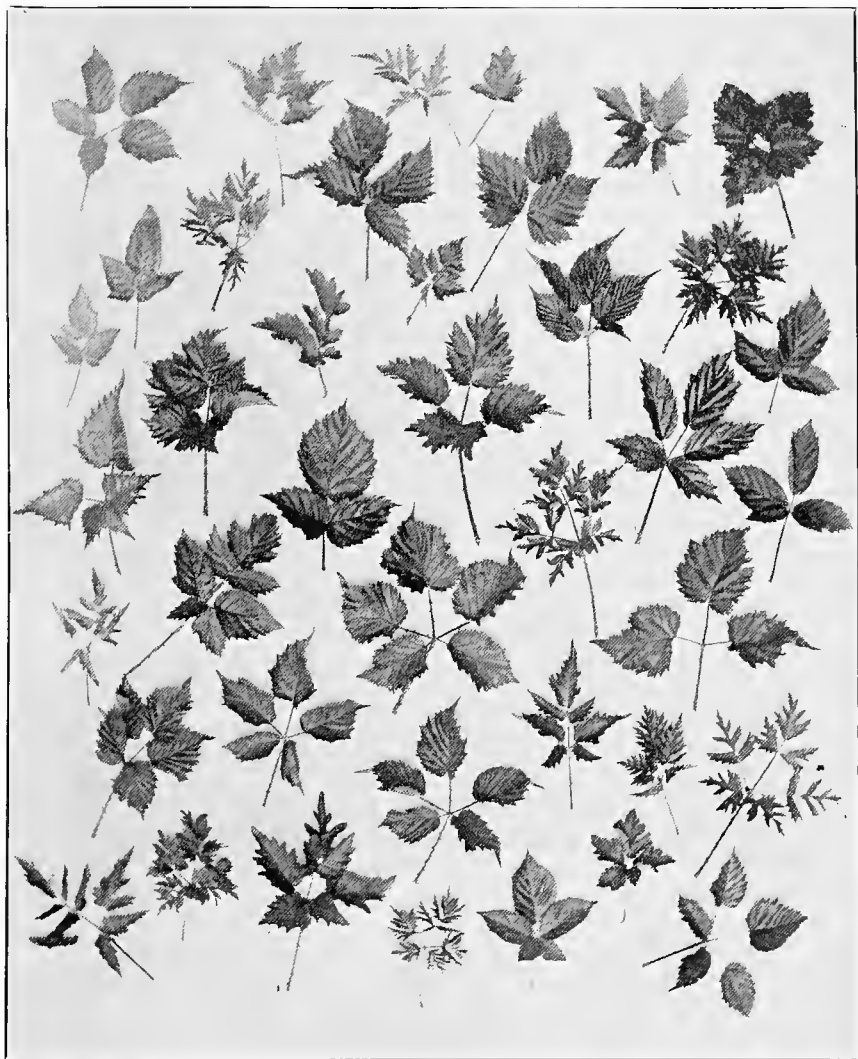
Nine hundred and ninety-nine young men out of a thousand would have stopped right there, and drawn their extra pay for the rest of their lives; but Burbank saved what he could until he bought a twenty-acre farm in Lunenburg, Massachusetts, and returned to "potato-growing, and other experiments." He never seems to have cared for large pieces of land, having found out thus early the value of the "little farm well tilled."

In 1874, as I hear, he took prizes at the Lunenburg Fair—one for 43 varieties of potatoes, some of them his own seedlings which "sold for a dollar an eye." Here again was another average man's temptation to settle down to more farming and the endless struggle to produce worthy successors of the Burbank potato. In that case, horticultural history might have given him a mere lower-case line among the many bean, corn, cabbage, cucumber, potato and watermelon growers of America.

It seems, curiously enough, that there was a plan about this time to make a physician out of this slender, shy young man, and he had studied medicine to some extent. Certainly had he gone heart and soul into such work he had the making of a most sensitive, capable, country doctor of the kind which lives in New England literature, but, in his own words, "circumstances changed the current," and in 1877 he came to California, bought land near Santa Rosa, in a most fertile and beautiful region, and became a commercial nurseryman.

Here Burbank grew fruit trees by the hundred thousand—all the approved old varieties—and sold them in carload lots in the years when everybody planted orchards, and when no one could get enough of certain kinds. He was lucky—or shrewd—for he made some of the "ten-strikes" of that speculative period by having for sale the varieties of fruit most in demand.

Meanwhile he had been pursuing studies in botany and plant-physiology, and made innumerable experiments in crossing varieties and hybridizing species. Still, all this was but his diversion, and once again the average man's duty lay plain before him—to build up the leading commercial nursery on the Pacific Coast. He had the ability and the means for this. Such a step seemed so inevitable that the announcement in 1888 or 1889 that Mr. Burbank "had sold out his nursery" which "paid him ten thousand a year" net profits, and was going to devote his entire time to producing new things, was something of a shock even to his friends, who now saw him fairly on the way to the poor-house or the asylum. For who on earth ever bought California seeds, bulbs or new fruits or flowers? England,



BLACKBERRY-RASPBERRY HYBRIDS.
Variations in leaf of one lot of seedlings.

Holland, Belgium, France, Germany furnished these things to the trade—and would forever continue to furnish them. But in reality there was a question of health involved ; the commercial nursery, with its overwhelming year-long labors, had broken down his health, and here was a worn-out, frail man, taking up an untried, nay, a seemingly hopeless, task.

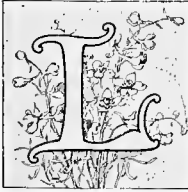
Thus driven by fates and fortunes around a great circle, behold this genius back in what by poetic license we may term his ancient potato-garden, a boy in heart, a man in mind, again putting his whole time into the effort to direct nature's processes. But this particular "potato garden" is in California, and consists of one small piece of land in Santa Rosa, his home, and other small pieces in Sebastopol, in the hills on the western rim of the valley, eleven miles away. And soon instead of potatoes we have what no other garden in the world can show. In fact, a man who has walked with Burbank through his plantation these ten



A FIELD OF PERENNIAL, SWEET PEAS.

years and more (since in reality his preparation for this work has spread over the whole period since he came to California), can only describe the sum total of results by saying that here is such a revelation of horticultural possibilities as never before was put into plain, visible, out-door fact.





LET us sum a few of the results of the remarkable work of this great plant-breeder, Luther Burbank, in recent years: In 1887 he introduced five new varieties of Japanese plums, not seedlings, but valuable and the parents of many useful sorts. In 1888 he introduced twelve more varieties. In 1893 he sent out six fine seedlings of his own, besides new walnuts, quinces, blackberries, raspberries and useful hybrid berries. A beautiful dwarf calla and a giant one, both now grown in all the leading nurseries of the world; also new poppies, myrtles, and tomatoes were among his other successes. In 1894 and 1895 the world received more plums and quinces, besides prunes, berries of exquisite flavor and of unprecedented size and beauty, the famous blackberry-raspberry hybrids (40,000 hybridized seedlings were destroyed in successive "rogueings" by Burbank's unerring hands in order to leave as the last survivor his "Paradox"). New clematises, callas, roses, and, more than all, an army of cross-bred lilies, were included in the triumphs of this period. These lilies are still being developed by Mr. Burbank and Mr. Carl Purdy, the leading Californian bulb authority, and will be more particularly described and illustrated in another paper.

The new plums sent out in 1898 and 1899, "Apple," "America," "Chalco," "Pearl," "Climax," "Sultan," "Bartlett," and "Shiro," and the "Sugar" and "Giant" prunes, were all acquisitions to horticulture. Not all are of equal commercial importance, but all are finding places in gardens and orchards, and some are doubtless destined to supplant other varieties. Modern horticulture demands many more varieties than formerly, to suit different localities, markets and seasons. It is fortunately impossible to bind up all excellences in one fruit, and it is the especial glory of Burbank that he has succeeded in producing so many new flavors, so many fruits suited to various purposes and to different climates. His Wickson plum where it succeeds best, and especially in Southern California, is perhaps the finest of the earlier Japanese crosses; his Sultan, which is a cross between Wickson and Satsuma, is a superb plum; his Sugar prune, which by analysis contains when fresh nearly twenty-four per cent. of sugar (the average of the



A GIANT AMARYLLIS, BREED BY BURBANK (10 $\frac{1}{2}$ INCHES ACROSS).



ONE OF THE SUCCESSFUL BLACKBERRY-RASPBERRIES.

French prune being about eighteen and one-half per cent.), is being commercially tested in all the prune regions of the world.

At the present time he is sending out a new early plum called "First," which is bred from selected varieties of American and Japanese plums, giving flavor and hardiness. Another plum, "Combination," was tested for quality; "with 25,000 bearing varieties" grafted and seedling, and proved best of all. Besides plums, there is a new and choice peach, "Opulent," and a new apple, "Winterstein," both well worth the attention of propagators, and selected

from over fifty thousand interesting and attractive cross-bred seedlings.

He is now occupied with a seedless plum not yet perfected, but on the way. The hard shell has nearly or quite disappeared, leaving in some cases merely an abortive rim and a very small kernel. The latest result along this line is a "large, sweet and delicious plum which bears neither seed nor stone." Whether or not seedless plums, cherries and other fruits, if they ever arrive, can be kept by grafting, or indeed whether they will maintain their flavor, must be left for this new century to decide. His "Plum-cot," another fruit in process of evolution, combines, as its name indicates, the flavor and characteristics of apricot and plum. Still another, and perhaps the most promising of his new fruits for the most trying climates, is the Improved Beach Plum, hardy as a Sierra pine, and bearing sweet, delicious fruits nearly an inch in diameter and hanging "as close as huckleberries" on the branches.

Many of Burbank's greatest achievements have been with flowers which, after all, lie nearer to his heart than any fruits. He has improved a large number of things for the seedsmen of Europe and America. One hardly knows how many modern "strains" of flowers came from his gardens. One silver-lined poppy, new, I think, this season, is a lovely



BURBANK'S "SHASTA"



DAISY," LIFE SIZE.

selection. His gladioluses certainly occupy a place of their own, and so do his cannas, roses and clematises.

Among the new types of flowers soon to be expected are a host of improved California poppies; also a strain of perennial peas into which Burbank has been trying to introduce the colors and fragrance of the best sweet-peas, which would certainly make one of the noblest and most useful of all garden perennials. He has also taken up the brilliant Mexican *Tigridias*, and has already produced much finer flowers in new, gladiolus-like hues. The *Sedums*, *Echeverias* and that entire class of succulents much used in Europe for formal garden designs, have been in hand for some time, and, I understand, with many striking results.

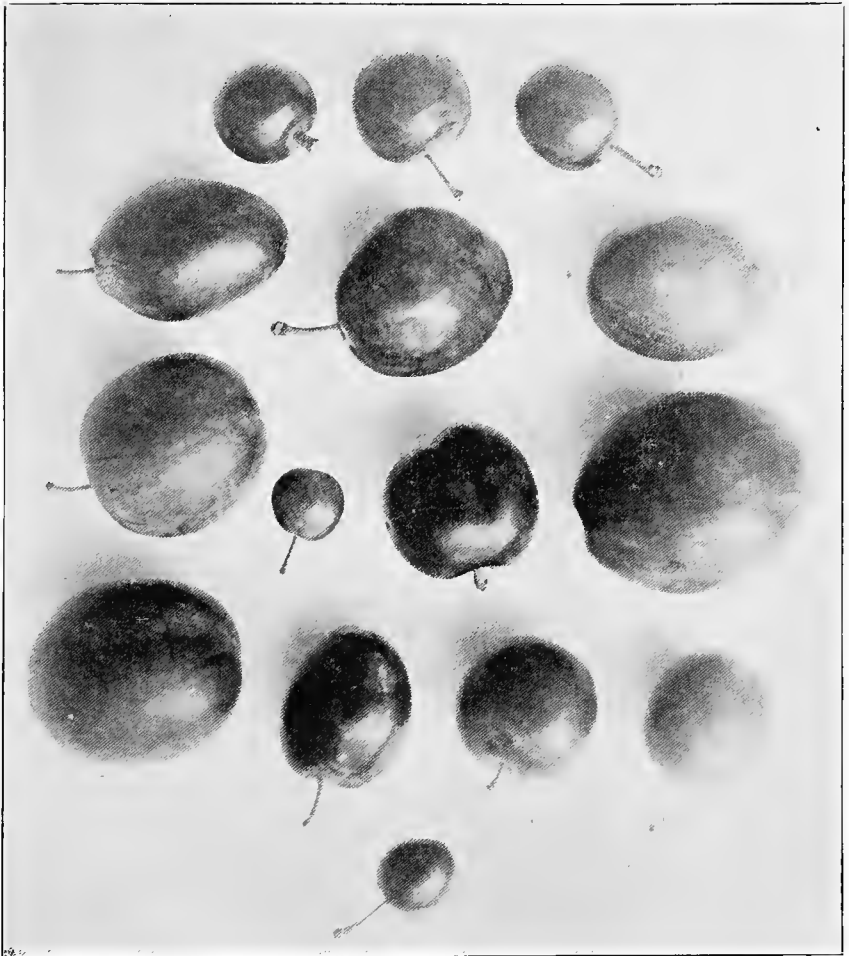
None of these things, however, are more "stunning" in their park and garden possibilities than the new *Amaryllises* and "Field Daises" of this flower-maker. The *Amaryllises* are a vast group of species of brilliant Cape bulbs of growing popularity, even where their culture must be in

greenhouses. In California gardens they justly take very high place. Now Burbank, by hybridizing species, has secured a type which has flowers measuring nearly a foot across, and four or five such flowers are in a cluster. There are thousands of seedlings of this new giant *Amaryllis*, and

the varieties are being selected and made more permanent. Lastly, for there must come some sort of an end to this list, we have already the new "Field Daisy" which was produced by hybridizing the well known and common American wild species with the large, coarse European species, and the result with Japanese species. After this, rigid selection for years has given the gardens of the world what Burbank names "Shasta Daisies." The very abundant flowers of the purest white are often four inches across. There are several rows of petals, and the type is breaking into other forms and colors, and is beginning to "come double." This new "perennial candidate" for election to garden honors from the Gulf of Mexico to Hudson Bay (so wide is its range of climatic endurance) was, as noted, developed from coarse, ill-smelling and rowdy weeds.

The published writings of Luther Burbank are comparatively few. He furnishes his own descriptions of novelties, and he has occasionally contributed to horticultural journals. He read a striking paper before the Sacramento Session of the American Pomological Society, January 18th, 1895, and another paper is soon to be published by the American Association for the Advancement of Science. He read an essay before the California Fruit Growers' Association in San José in 1898. It is not likely that we shall ever have a book from his pen, but his notes, journals, registers and scrap-books will some day possess unique value, and should belong to one of the California universities. The recent publications of the Department of Agriculture contain much material furnished by Mr. Burbank.

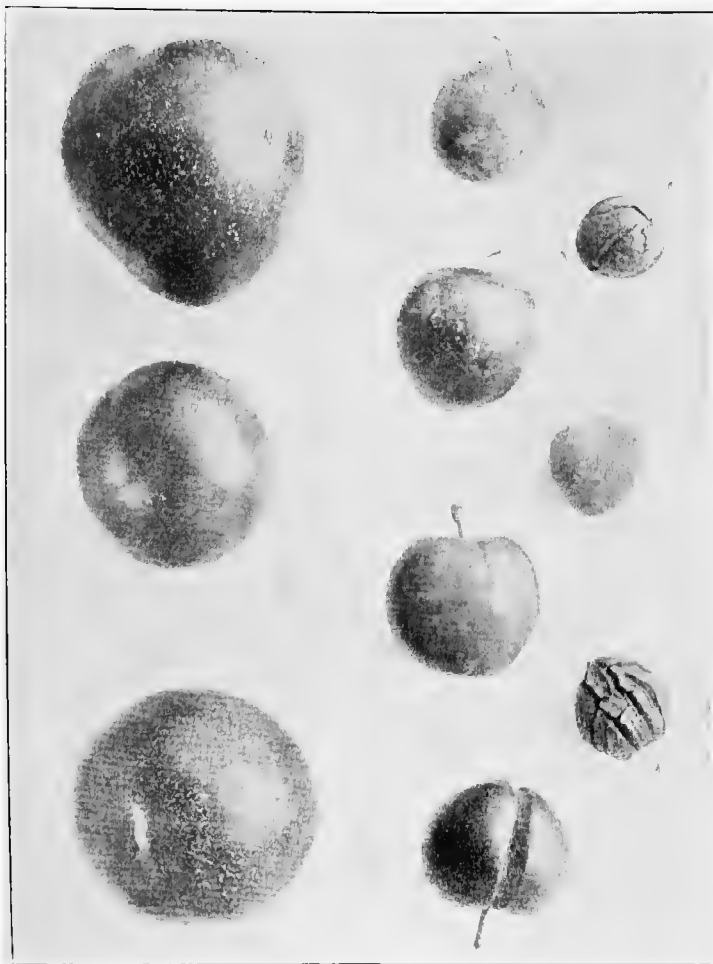
One of the best illustrations of the esteem in which Burbank is held "among those who know" is furnished by the recent action of the Royal Horticultural Society of London, which was established in 1804, and holds unquestioned primacy in its field. This great society, in 1898, planned a "Hybrid Conference," which took place in July, 1899, and whose results were published in 1900. The call was for a Conference on "Hybridization (the cross-breeding of species) and on the cross-breeding of varieties," and the Society then sent out special invitations to one hundred and twenty-five distinguished "hybridizers", nine of whom were Americans (four of them, however, from the Department of Agriculture at Washington). Only one, Luther Burbank, was selected from the Western half of the continent. He did not attend; he was too busy even to send an essay, but Professor Bailey of Cornell, and others, alluded in glowing terms to his success in producing "new values in fruits and flowers."



THE STONELESS PLUMS.

This group represents the development of a large seedless plum (the biggest on the plate) from small and worthless ones approaching seedlessness.

Among the leaders of this notable Conference were the specialists in the production of new flowers and fruits, and also, some of the great, historic figures in botany and horticulture—such men as Sir Joseph Hooker, Sir Wm. Thiselton-Dyer, Max Leichtlin, the Vilmorins, George Nicholson, Lemoine, of gladiolus fame, Crozy, the producer of new cannas, Eckford, the father of modern sweet-peas, Rev. W. Wilks, the genial author of Shirley poppies, Dr. Trabut of Algiers, who has introduced some superb Euca-



CROSS-BRED SEEDLING PLUMS.

Many cracked and worthless, but finally perfected in Burbank's superb
"Climax" Plum.

lyptus hybrids, Burbidge, one of the daffodil authorities, Dr. Masters, editor of the *Gardeners' Chronicle*, Lord Penzance, the introducer of new forms of sweet-brier roses, and many others whose names are as familiar as household words wherever flowers are grown. Gold medals and other honors were given for the best hybridized or cross-bred orchids, ferns, water-lilies, passifloras, roses, clematises, and a host of other novelties.

And yet these wonderful results of European horticultural science were but the manifestations of an old and highly-specialized civilization. Burbank, with his strong individuality, his faith in outdoor methods and in cross-fertilizing on an immense scale, in every case following with selection after selection, is, on the other hand, a remarkable manifestation of the originality of genius. He has profoundly affected the methods of modern plant-breeders, and younger men, following in his footsteps, will continue to emphasize the advantages of a climate like California, and of such free, outdoor, large-scale operations as those which have yielded such splendid results at Santa Rosa and Sebastopol.



WHILE California was still a Mexican province that sturdy Scotchman, David Douglas, the famous botanist and plant-discoverer, found and described some of the wild bulb-gardens of the Pacific Coast. This was between 1827 and 1833, and he sent bulbs of many species to England, where they were grown, exhibited at floral shows, named, described, illustrated with color plates and much admired. It was generally felt by horticulturists that most valuable additions had thus been made to the gardens of Europe.

These glowing expectations were doomed to a long disappointment, for there was then no Carl Purdy to study the habits and surroundings of the native bulbs, week in and week out, at all seasons, in all parts of California, and so to master his subject as to be able to simplify their undoubtedly difficult culture, finally making it practicable in both Europe and America to grow these most beautiful plants as easily as anemones, tulips and hyacinths. Importation after importation had failed utterly, and European gardeners had given up the effort until hardly a catalogue ventured to list these shy, wild bulbs of California; even when a few species appeared, it was without cultural directions, and at prices which kept them beyond the reach of the average purse.

Now, this was not a small matter, though it might easily seem so to a casual observer. Here was a neglected industry; here was a very large group of many genera and species of bulbous-rooted plants, natives of the Pacific Coast, quite lost sight of, while the bulb-flora of regions like South Africa was receiving all possible attention from collectors, dealers, growers and plant-breeders.

The work of making this neglected class of plants widely known required peculiar qualities, a combination, in brief, of the equipments of field-botanist, horticulturist and business organizer. During the last twenty years, a very interesting Californian,



CARL PURDY, JAN., 1901.



MARKING VARIETIES OF LILIUM WASHINGTONIUM IN PURDY'S GARDEN.

Carl Purdy of Ukiah, has built up connections all over the world, has created a trade in Pacific Coast bulbs, has made an enviable reputation at home and abroad as a specialist upon their culture and botany, and is now working, with Luther Burbank of Santa Rosa, to develop new races of California hybrid and cross-bred lilies. More than this, he is steadily developing unthought-of possibilities in the way of cultivating species of exotic bulbs here, so that California, under his guidance, bids fair to become more of a world's bulb-garden than Holland or the Channel Isles — and bulb-growing represents one of the very highest arts of intensive horticulture.

Carl Purdy was born at Dansville, Michigan, March 16th, 1861. His ancestors on both sides were among the first settlers in colonial Connecticut. When he was only four years old, his parents "crossed the plains" by the old emigrant trail, stopping for a time at Truckee Meadows, Nevada. But in 1870 the family settled down in fertile and beautiful Ukiah Valley, in the heart of Mendocino county, and here the boy grew up, fought his way to a fair education, was for a time a school-teacher, married a very helpful and attractive wife, and little by little took up his life-work, this new bulb-culture, which may possibly prove to be the occupation of his family for several generations to come.

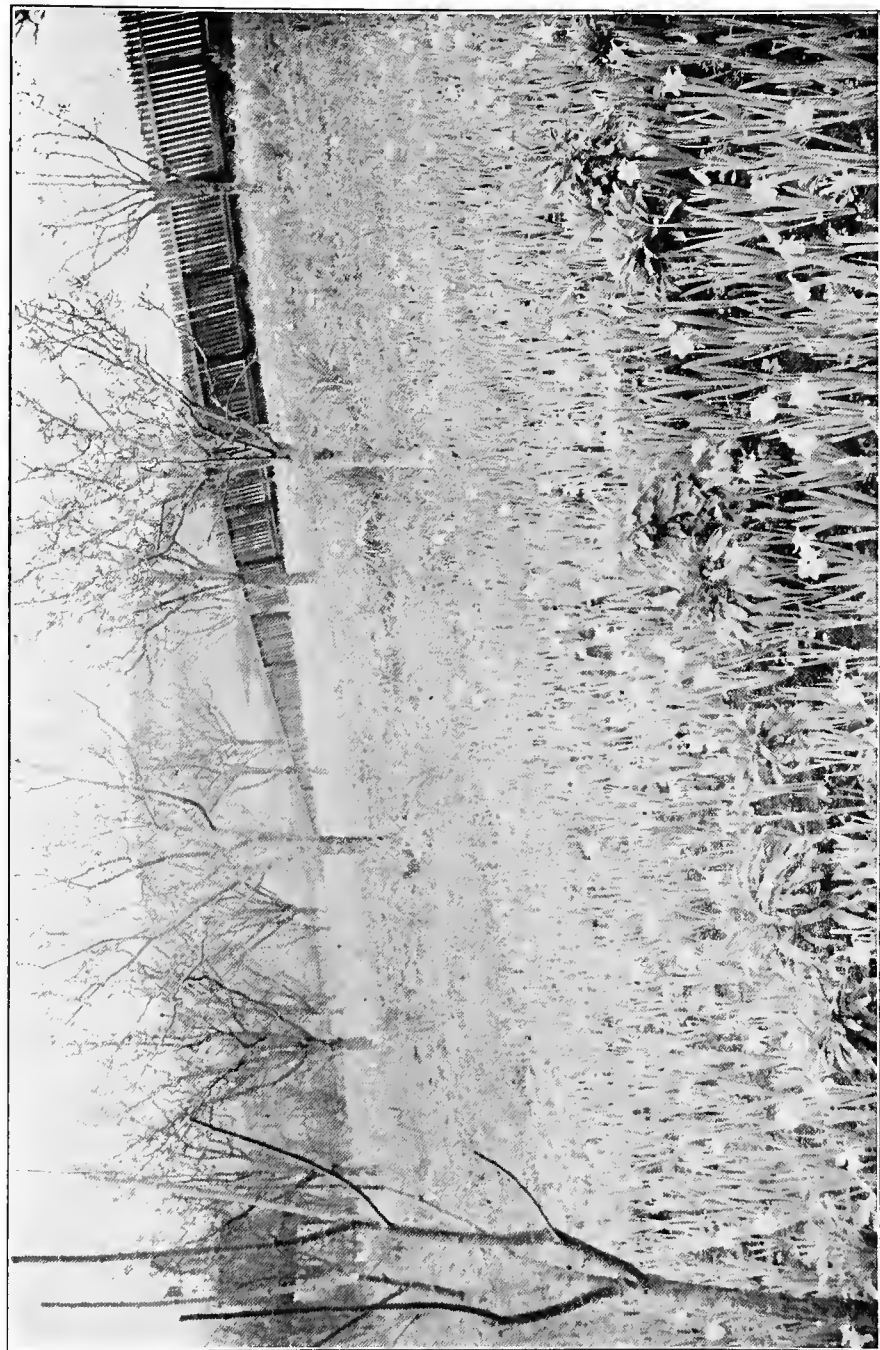
The first distinct view that we obtain of this tall, gray-eyed California boy, back in the Seventies, is that of a faithful little toiler, "making garden" for an elder sister, and visiting a famous old Glasgow Scotchman, Alexander McNab, who had made his home in the valley and was a notable flower-lover, receiving rare plants and seeds from every part of the world. The broad, thinly-settled valley and the dull, narrow-hearted village seemed to offer little or nothing to keep any boy there; others left to look for wider activities. But this boy held on, quietly, patiently, weaving his web of life in the land where he belonged, and that, as I take it, is much to his credit. At the age of eighteen he was teaching a small country school.

About this time (1879) some American firm of seedsmen wrote to Mr. McNab asking if native bulbs could not be obtained. He turned the letter over to the young school-teacher, and the latter sent a pressed *Calochortus* flower, and afterward sold "a hundred bulbs for \$1.50," the beginning of a business that gradually increased until by 1888 school-teaching was given up, and at the present time Mr. Purdy gives most of his attention to the business, distributes yearly something like a quarter of a million native bulbs to European and American wholesalers, employs a

number of assistant collectors, and has become recognized as the greatest living authority on Pacific Coast bulbs. Nevertheless the bulk of his business is done with a few large firms, and he sells few bulbs in California, for as yet there is hardly any demand at home. Our own bulbs are too different from the old florist types, but flower-lovers are beginning to recognize their value.

At the present time the Californian bulbs known to planters consist of about one hundred and forty-five distinct varieties and species. The *Brodiaëas*, handsome, hardy bulbs with showy, long-keeping flowers in umbels, chiefly white, blue, purple, yellow, lilac or pink in color, include about thirty species grouped by Purdy in six sections. The *Calochorti*, which include some of the most graceful as well as some of the most showy flowers in the world, consist of about forty species and varieties, arranged by Purdy in three sections and a number of minor groups and strains. This family represents one of the most difficult of known assemblages of species for the botanist to classify, on account of remarkable variations resulting from natural crosses and hybrids through ages past. It is only a tireless field-botanist who is capable of writing a monograph on the great *Calochortus* family with its lovely "star tulips" (once called *cyclobothras*); its "sego lilies" from Utah; its dazzling scarlet species of the desert (*C. Kennedyi*); its superb yellow "clavatus" forms, and its hardy and vigorous types of the true *Mariposas*, or "butterfly tulips." These and many other forms growing wild, closely approach each other by gradations of the most interesting character which in the end bring to grief the mere closet-botanist who is always in danger of clinging too closely to his type specimen. Besides these families of bulbs, there are the *Camassias*, food-bulbs of bears and Indians; the exquisite *Erythroniums* (dog-tooth violets); the *Fritillarias*, *Bloomerias* and *Trilliums*, the fine *Clintonias* of our red-wood forests, and many other beautiful bulbs which are becoming favorites in distant lands.

The wild lilies collected by Mr. Purdy include about fifteen species, arranged by him in four groups. Some resemble the well known tiger-lily; some are white, yellow or pink, and, taken collectively, they form one of the most promising of beginnings for the plant-breeder. It is in such lilies that Luther Burbank has made an especially interesting "new departure." Some of the California wild lilies, as they grow in the mountains in localities adapted to their finest development, form wonderful masses of color and motion. I have seen *L. Humboldti* at its splendid best on a spring-fed mountain slope beside the American River, where



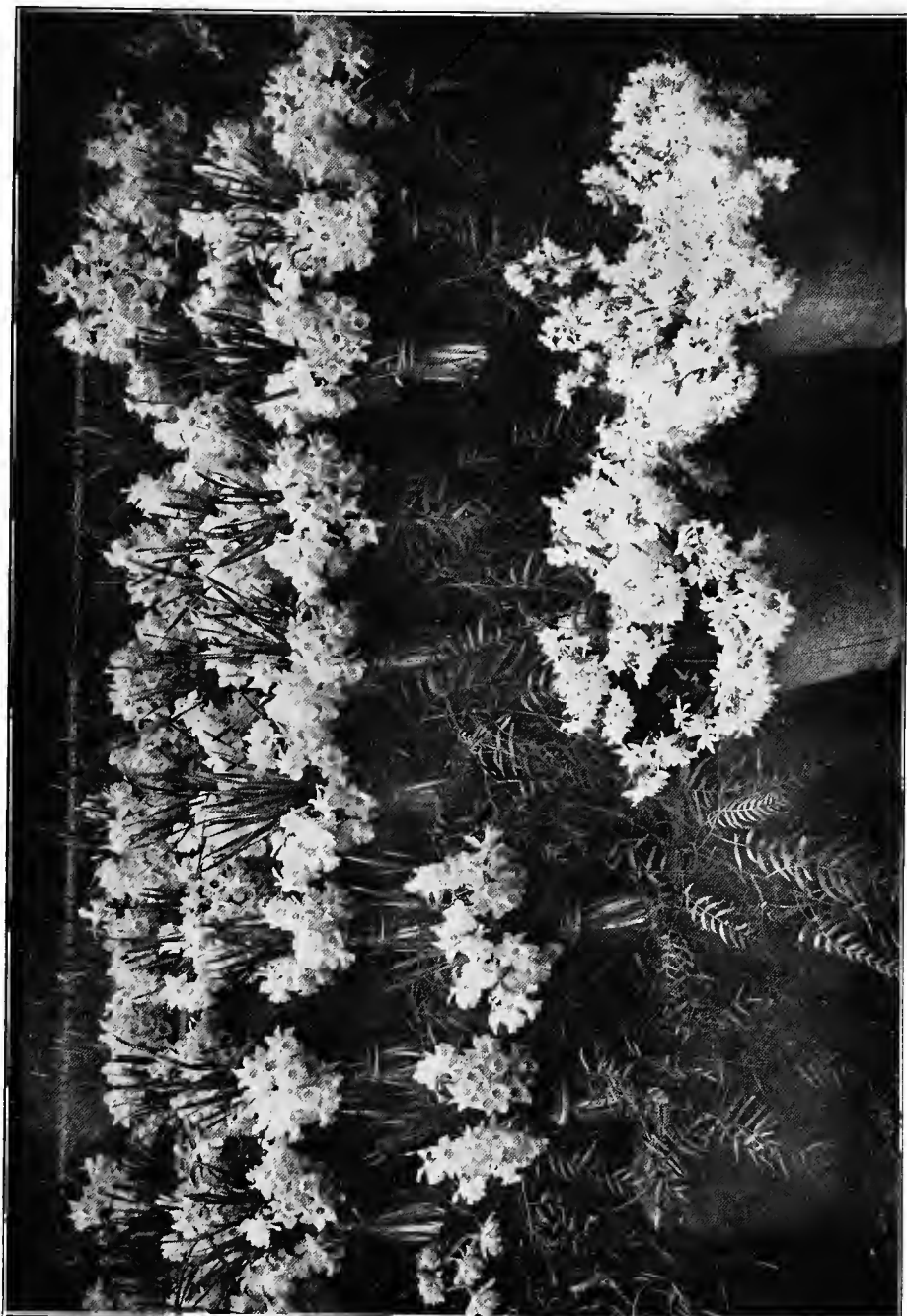
MRS. KERSKY'S DAFFODIL GARDEN IN JANUARY.

an acre of tall plants in full carnelian-red splendor stood with stems a handsbreadth apart, under giant conifers, moving, flashing, in the Sierra wind and sun. But no one has yet succeeded in finding the wholly satisfactory kind of lily to endure drought and trying conditions of the average garden. Therefore years ago Mr. Purdy and Mr. Burbank began to work upon the interesting problem—one, by choosing hardiest stock and native hybrids; the other by crossing and raising thousands of seedlings. Finally, after much selection from these, the best were sent to a natural lily-garden in the mountains between Mendocino and Lake counties, where Mr. Purdy watches and works to improve them still further. There is no other lily-garden in the world that holds more promise of improvement and more hardy types than this. Color, shape and habit of growth have all developed surprisingly, and the end is not yet.

It is probable that these two men will here in ten years produce more new and desirable varieties of lilies than have been produced by all the lily-growers in the world during the last century.

Leaving these things, let us return to Purdy, the man, as he appears to an observer these January days of 1901. Different in almost all outward respects from Burbank, at once more Puritan, more saturnine, more weighted down with a sense of life's responsibilities, and nevertheless more blessed with an underlying humor, he is not unlike Burbank in his love of the outdoor world and his absolute veracity. He has more interests, more diversity of occupations and more social relations than our garden-centered marvel, Burbank, and he possesses in a higher degree those organizing faculties which can use subordinates. He has written and published a good deal, sometimes on topics of merely local interest, but oftener on subjects of more permanent importance. I had hoped to make room for a list of his botanical papers, but can only speak briefly of the more important of these. They are scattered through the ten volumes of Professor Sargent's *Garden and Forest*, the recent issues (since 1897) of the *London Garden*, the *May-flower*, and *Erythea*. Often they are upon redwoods and other forest topics; many are botanical and outdoor studies, and all are singularly simple, exact and convincing. His *magnum opus*, now in press, soon to appear as a publication of the California Academy of Science, is titled, "Revision of the Genus *Calochortus*." This really represents the botanical labor of twenty years, and it should secure Mr. Purdy an honorable place among the specialists.

Summing up Mr. Purdy's work for California horticulture, it can truthfully be said that he first made the collec-



100 DOZEN DAFFODILS READY FOR MARKET.

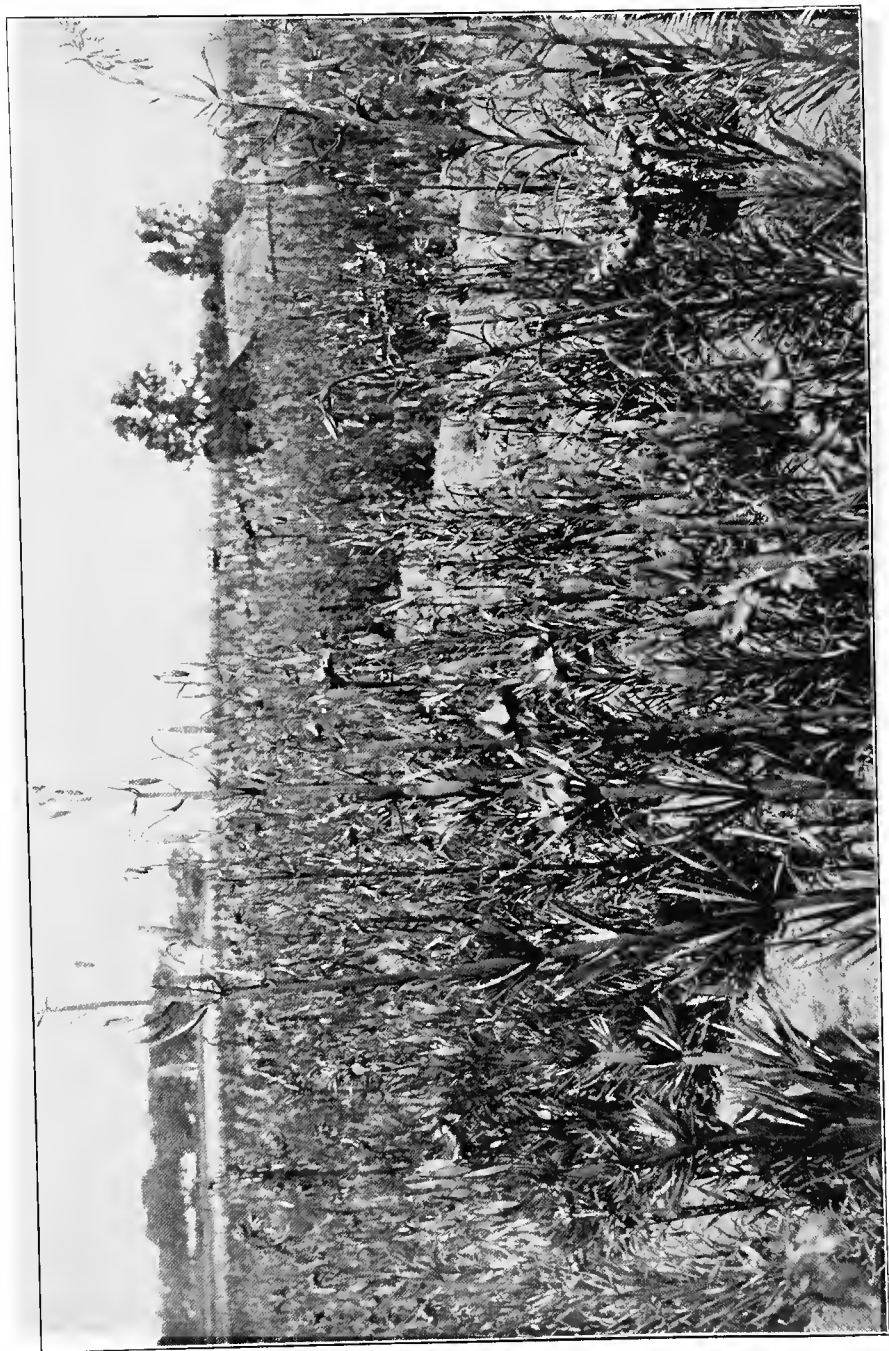
tion and sale of wild bulbs successful by studying and systematizing their culture in his own Ukiah garden, after collecting them in their native places. He then devoted special attention to lilies and calochortuses, selecting and introducing the best strains. It only remained for him to develop general bulb-culture, and this is now one of his most important lines of work. He believes that nearly all the profitable species of bulbs grown for market in the older centers of horticulture can be grown quite as well here as in France or Holland. In some respects we have advantages over the classic bulb-growing regions, and Mr. Purdy is now growing daffodils and other bulbs expecting to ship the future crop to bulb-merchants abroad.



A GLIMPSE OF PURDY'S LILY-GARDEN.

Daffodil culture heretofore has been only a flower industry in California. Nearly all the daffodil gardens are close to the Bay of San Francisco. The largest and oldest is situated near Niles, but as that is a family affair, it would hardly be proper to expound its advantages here. All daffodil gardens are glorious when in bloom, and are favorites of art and literature. Central and Northern California seem better suited to the large-scale culture of daffodils, jonquils and other species of *Narcissi* than do the southern counties.

Daffodils grown in the valleys are not so early as those grown on the hillsides, and thus it happens that the finest



IN A LILY FIELD.



A 2-PETALED SEEDLING LILY.

daffodils that the wealth and fashion of San Francisco are able to wear come from a most excellently kept garden, that of Mrs. Ivy Kersey, at Haywards, Alameda county. This lady has long collected the leading species and varieties of daffodils—those that Barr and others have found, and that Burbidge, Englehardt and others have hybridized, cross-bred and improved almost beyond reckoning. She certainly takes high rank among daffodil-growers of California, and is also doing good work with Spanish and English irises and other genera of bulbs. Like Mr. Purdy she believes it possible that California will become a leading bulb-producer, and is trying experiments with cross-breeding varieties. But as long as the flowers are in such demand,



SEVERAL SPECIES OF CALOCHORTI.
(California Mariposa Tulips.)

bulb-gardens near San Francisco will continue to supply chiefly the flower markets. Some of these days if our plant-breeders produce sufficiently improved varieties of the Irises, Gladioli or Narcissi, whole carloads of California-grown bulbs may go forth to the uttermost bounds of civilization.

There is already a large and increasing demand for Cal-



LILY SPIKES, IN THE FIELD.

ifornia-grown seeds of vegetables and flowers and trees. Some of the most beautiful garden-acres that the wide earth has to show are in Los Angeles, Ventura, Santa Barbara, Santa Cruz, Santa Clara, San Mateo, San Rafael, Alameda, Humboldt and other counties for the production of "out-door" seeds, which are larger, heavier, more highly vitalized than seeds of corresponding species and varieties gathered in Europe, often from pot-grown plants under artificial conditions. Even the "novelties" of the modern seed catalogue do not always come from Europe. But the story of California as a seed-growing land, though one of the most attractive chapters of modern horticultural history, must be left until "a more convenient season." Every one of our famous seed-growers, here as elsewhere, is shaking pollen dust on opening pistils and sowing seeds of promise. Thus it has come to pass that there is now as much need of a book upon California floriculture as there



ARD-RIGH DAFFODILS, AT HAYWARDS.

ever was for books (which we fortunately have) upon "California Fruits" and "California Vegetables."

In conclusion, however, returning to the two men whose work for horticulture has been briefly considered in these three papers, we are brought face to face with a problem. Our Government each year appropriates \$40,000 to each State in two funds, the Morrill Aid and the Hatch, more than half of which is used for agricultural education and for experiment stations. Why is it, men sometimes ask, that such productive energies as those of Luther Burbank and Carl Purdy are not somewhere employed in this immense governmental system? Why should not the State and the Nation utilize such a plant-breeder as Burbank, who has produced more "novelties" in ten years than all the experiment stations of America? And the answer is this: such a man cannot be harnessed to a small salary, strict supervision and the complicated machinery of official life. He must forever "walk alone like a rhinoceros." He has not had the close training required to plan and organize scientific experiments such as those carried on at Rothamstead in England, and at many places in America. Much less can he become the hireling of any system, to make reports, answer questions, obey orders and give up his present independence. The experiment stations do require and obtain great practical talents and high scientific attainments, and they are working in harmony with all that is done by such strongly individualized horticulturists as Burbank; but beyond all this, they are studying and endeavoring to apply those principles which in the largest sense underlie all agriculture. Modern, intensive horticulture is a resultant of the teachings and practice of the best agricultural science as exemplified in the experiment stations, and one of the most favorable signs of the future of this science in America is the increasing number of men and women of skill, often of positive genius, who are magicians, according to their several abilities, in Nature's limitless realm of fruits and flowers.



THE LAND OF SUNSHINE

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